

Microprocessor control unit for the washing machine of the milking plant

¹Kulakov P. I., Dr. Sc., professor; ¹Kucheruk V. Y., Dr. Sc., professor;

²Kulakova A. P., engineer

¹Uman National University of Horticulture

²Vasyl' Stus Donetsk National University

The washing machine control unit with new functionality is proposed, which can be used on milking plants with a milking line as part of the information system. The unit is designed for automatic control of the pre-milking washing, post-milking washing and disinfection processes of a milking plant with milking line (UDM-100, UDM-200) or similar. The unit also provides data transmission on the results of washing programs and parameters of the washing process to the interface unit of the information system, and manages electronic milk dispensers to ensure optimal washing.

The pre-serial washing machine control unit, which can be integrated into the information system of the livestock farm, was developed by researchers of the Information Technology Department of the Uman National University of Horticulture in cooperation with AGROPROMSERVIS LLC [1, 2] and can work as part of the information system, as well as in offline mode.

The electrical structural diagram of the developed washing machine control unit, which can be a component of the information system of the functioning parameters of the milking plant with a milking line, is shown in Fig. 1.

The principle of the unit operation is as follows. The washing machine control unit can function as a part of the information system and is intended for automatic control of the processes of pre-milking washing, post-milking washing and disinfection of a milking plant with the milking line (UDM-100, UDM-200), or similar. The washing machine control unit provides control of the milk pump, vacuum pump and heater, which are switched on and off by means of external contactors.

When the control unit functions as part of the information system, the data it transmits to the interface unit is an integral part of the data array, which is used to evaluate the quality of the milking plant [3]. Electronic milk dispensers provide detection of facts of dilution of milk with water using the methods discussed in the paper [4]. The vacuum pump control unit performs the function of a vacuum meter, designed to record the date and time of the vacuum pump on and off, measure the average and instantaneous value of the vacuum pressure and the angular speed of rotation of the vacuum pump electric motor [5].

Список використаних джерел

1. Official website of the AGRO-PROMSERVIS company. - [Electronic resource]. – Access mode: <https://agropromservis.net.ua/>.
2. Кулаков, П. І. Елементи теорії вимірювального контролю параметрів біотехнічної системи доїння / П. І. Кулаков. – Вінниця : ВНТУ, 2015. – 220 с. - ISBN 978-966-641-641-7.
3. O. Ivanets, I. Morozova, P. Kulakov, V. Kucheruk, A. Kulakova and Y. Moskvichova, "Criterion Assessment of the Probability of Deviation of Objects from the Normal State," *2021 XXXI International Scientific Symposium Metrology and Metrology Assurance (MMA)*, 2021, pp. 1-5, doi: 10.1109/MMA52675.2021.9610867.
4. Kucheruk, V. Measurement of the Number Servings of Milk and Control of Water Content in Milk on Stall Milking Machines / V. Kucheruk, P. Kulakov, N. Storozhuk // *Proceedings of the International Conference SCIT 2016*, May 20-21, 2016, Warsaw, Poland. Recent Advances in Systems, Control and Information Technology. Part V, Volume 543 of the series Advances in Intelligent Systems and Computing, pp 435-447. - 01 December 2016. - DOI: 10.1007/978-3-319-48923-0_46
5. Volodymyr A. Podzharenko and Pavlo I. Kulakov “Photoelectric angle converter”, Proc. SPIE 4425, Selected Papers from the International Conference on Optoelectronic Information Technologies, (12 June 2001); <https://doi.org/10.1117/12.429768>